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Fig. 13, being an end view, shows the thin tube within the pipe.

Fig. 14 shows the nib *o* of the key without the sliding-bit; it has a groove *p* for the end of a pin fixed in the sliding-piece *c*, to move in and keep it from coming off; *q q*, figs. 1 and 2, the ridge of the tumbler *e* against which the prominent end of the bit *c* acts; *r* the part of the key-bit which acts against the curved end *f* of the tumbler *f* to raise it.

XIII.—TRUSSED GIRDER OF WROUGHT IRON.

The SILVER VULCAN MEDAL *was this Session presented to Mr.* GEORGE SMART, *of King's Arms Wharf, Lambeth, for his* TRUSSED GIRDER OF WROUGHT IRON, *a Model of which has been placed in the Society's Repository.*

King's Arms Wharf, Lambeth,
November 17, 1826.

DEAR SIR;

I HAVE sent for the inspection of the Society a model of a wrought-iron beam of my invention, applicable for bridges, girders, breastsummers, roofs, or other purposes where stiffness, strength, and lightness are required.

I am, Sir,
&c. &c. &c.
GEORGE SMART.

A. Aikin, Esq.
Secretary, &c. &c.

The girder is made by welding an arched bar of wrought iron to a longer straight bar, and then turning the ends of this latter either up or down as may be most convenient for the particular use to which the girder is to be applied. Fig. 15, Plate VII, represents the girder, *t t* being the places where the bars are welded together; *u u* the ends of the straight bar turned either up or down. The arch is prevented from giving way or buckling when the weight presses upon it, by means of blocks of well seasoned wood inserted at intervals between the two bars, and secured in their places by the iron straps *v v*, and which inclose both the bars.

Beams of wrought iron made in this way will, in Mr. Smart's opinion, support a weight so much greater than cast iron ones of equal dimensions, that they may be made of any given strength at half the cost of equivalent cast-iron beams.

This mode of forming bearing bars has been used in a new and ingenious manner, to sustain weights of extraordinary magnitude. A very heavy mass of brick-work, over a gateway leading from the Poultry, is supported in this manner, under circumstances which would have precluded the use of timber, and with a degree of permanent durability, of neatness, and of architectural propriety, which would not have been compatible with a timber support. The lateral thrust of a heavy brick arch over the same gateway is resisted by a similar contrivance. Mr. Smart recommends it strongly for bond joists, &c. as affording an easy way of securing angles and party walls, where, in consequence of the occurrence of chimney flues, it is not safe to use timber. Strong bridging and ceiling joists are easily made from wide hoop iron rivetted together, with a slip of poplar between them to hold the flooring or lath nails. Neither fir nor oak, if thin, will endure nails being driven into or through it without splitting, nearly so well as poplar will; and this wood, besides being very durable, if kept dry, has the advantage of being much less combustible than either of the former.